

ABSTRACT

5 The objective of the current invention is to restore color vision, in whole
or in part, by electrically stimulating undamaged retinal cells, which remain in
patients with, lost or degraded visual function. The invention is a retinal color
prosthesis. Functionally, There are three main parts to this invention. One is external
to the eye. The second part is internal to the eye. The third part is means for
communication between those two parts. The external part has subsystems. These
10 include an external imaging means, an eye-tracker, a head-motion tracker, a data
processor, a patient's controller, a physician's local controller, a physician's remote
controller, and a telemetry means. The imaging means may include a CCD or CMOS
video camera. It gathers an image of what the eyes would be seeing if they were
functional.

15 Color information is acquired by the imaging means. The color data is
processed in the video data processing unit. The color information is encoded by time
sequences of pulses separated by varying amounts of time, and also with the pulse
duration being varied in time. The basis for the color encoding is the individual color
code reference. Direct color stimulation is another operational basis for providing
20 color perception. The electrodes stimulate the target cells so as to create a color
image for the patient, corresponding to the original image as seen by the video
camera, or other imaging means.

The physician's test unit can be used to set up or evaluate and test the
implant during or soon after implantation at the patient's bedside.